IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:	Atty Docket No. 200208727-1 (HPC.1245US)
Christopher A. Poirier et al.	
Application No.: 10/644,625	Confirmation No.: 7519
Filed: August 20, 2003	Art Unit: 2825
For: A SYSTEM FOR AND METHOD OF CONTROLLING A VLSI ENVIRONMENT	Examiner: S. Whitmore

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUMMARY OF TELEPHONIC INTERVIEW

Sir:

On or around May 26, 2011, a telephonic interview was conducted between Examiner Stacy Whitmore and the undersigned to discuss amendments to the claims to place the claims in condition for allowance. The Examiner identified two new references, U.S. Patent No. 6,908,227 and U.S. Patent No. 6,948,082, after the Decision on Appeal was rendered that reversed the Final Rejection.

As a result of the discussion between the undersigned and Examiner Whitmore, agreement was reached on proposed amendments on June 6, 2011. The undersigned sent unofficial amendments that amended each of the independent claims and various dependent claims, to the Examiner on June 7, 2011. On June 8, 2011, the Examiner confirmed that the Unofficial Amendment would be entered by Examiner's Amendment to place the claims in condition for allowance.

Agreement was reached regarding allowance of the claims.

Date: June 8, 2011

Respectfully submitted,
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1. (Currently Amended) A system comprising:

an integrated circuit on a VLSI die; and

an embedded micro-controller constructed on the VLSI die, ~~the micro-controller adapted to monitor and control the VLSI environment to optimize the integrated circuit operation~~;

wherein said embedded micro-controller is configured to:

monitor ~~monitors~~ temperatures at a plurality of locations on the integrated circuit;

monitor one or more parameters selected from the group consisting of: power supplied to the integrated circuit, an operating clock frequency of the integrated circuit, a power supply voltage supplied to the integrated circuit, and a power supply current supplied to the integrated circuit; and

control an environment of the VLSI die based on the monitored temperatures and the one or more parameters to enhance operation of the integrated circuit.

2. (Cancelled)

3. (Currently Amended) The system of claim 1 wherein the embedded micro-controller is configured to control ~~controls~~ at least one of the following ~~parameters~~:

temperatures at one or more locations on the integrated circuit;

~~the integrated circuit power supply;~~

the operating clock frequency of the integrated circuit;

the power supply voltage supplied to the integrated circuit; and

the power supply current supplied to the integrated circuit.

4. (Currently Amended) The system of claim 1 wherein the integrated circuit comprises two or more processor cores, each core having [[a]]an integer unit and a floating point unit, the ~~micro-controller~~ system further comprising:

temperature sensors at each of the integer units and floating point units on each of the cores.

5. (Currently Amended) The system of claim 1 further comprising:

embedded ammeters constructed on the VLSI ~~integrated circuit~~ die, the ammeters comprising voltage controlled oscillators.

6. (Currently Amended) The system of claim 1 further comprising:

fuses that provide hardware selection of ~~VLSI integrated circuit environment~~ the one or more parameters ~~that are~~ to be monitored by the embedded micro-controller.

7. (Previously Presented) The system of claim 1 further comprising:

updateable or replaceable firmware for controlling operations of the embedded micro-controller; said firmware comprising:

algorithms for determining how to respond to temperature, power, voltage, or clock parameters.

8. (Currently Amended) A method for monitoring and controlling an integrated circuit comprising:

providing an embedded micro-controller on a same VLSI die as the integrated circuit; [[and]]

monitoring, ~~and controlling a VLSI environment of the integrated circuit~~ with the embedded micro-controller,~~; wherein~~

~~said embedded micro-controller monitors~~ temperatures at a plurality of locations on the integrated circuit, and one or more parameters selected from the group consisting of: power supplied to the integrated circuit, an operating clock frequency of the integrated circuit, a power supply voltage supplied to the integrated circuit, and a power supply current supplied to the integrated circuit; and

controlling, with the embedded micro-controller, an environment of the VLSI die based on the monitored temperatures and the one or more parameters to enhance operation of the integrated circuit.

9. (Cancelled)

10. (Currently Amended) The method of claim 8 further comprising:

controlling, by the embedded micro-controller, one or more ~~processor~~ parameters selected from the group consisting of:

temperatures at one or more locations on the integrated circuit;

~~the integrated circuit power supply;~~

the operating clock frequency of the integrated circuit;

the power supply voltage supplied to the integrated circuit; and

the power supply current supplied to the integrated circuit.

11. (Currently Amended) The method of claim 8 further comprising:

controlling, using the embedded micro-controller, the ~~VLSI~~ environment to optimize an integrated circuit operating power level to approach a design limit.

12. (Currently Amended) The method of claim 8 further comprising:

monitoring, using the embedded micro-controller, a temperature in a particular location of the integrated circuit; and

reducing, using the embedded micro-controller, [[a]]the power supply voltage in response to an over-temperature condition in the particular location.

13. (Currently Amended) The method of claim 8 further comprising:

~~monitoring, using the embedded micro-controller, a temperature in a location of the integrated circuit; and~~

reducing, using the embedded micro-controller, ~~a processor~~ the operating clock frequency in response to an over-temperature condition in the integrated circuit.

14. (Previously Presented) The method of claim 8 wherein the integrated circuit is a processor, the method further comprising:

monitoring, using the embedded micro-controller, a temperature in a first core of the processor; and

transferring, using the embedded micro-controller, a processing workload from the first core to a second core of the processor in response to the temperature of said first core.

15. (Currently Amended) The method of claim 8 further comprising:

monitoring, using the embedded micro-controller, ~~current levels in the integrated circuit~~ the power supply current using ammeters comprising one or more voltage controlled oscillators.

16. (Currently Amended) A computer program product comprising a non-transitory computer usable medium having computer readable program code embedded therein, the computer readable program code comprising:

code for controlling an embedded micro-controller constructed on a VLSI die with an integrated circuit ~~die with a processor~~, wherein the code is for controlling the micro-controller ~~to monitors and controls a VLSI environment of the processor; where~~;

~~said embedded micro-controller monitors~~ monitor temperatures at a plurality of locations on the integrated circuit;

monitor one or more parameters selected from the group consisting of: power supplied to the integrated circuit, an operating clock frequency of the integrated circuit, a power supply voltage supplied to the integrated circuit, and a power supply current supplied to the integrated circuit; and

control an environment of the VLSI die based on the monitored temperatures and the one or more parameters to enhance operation of the integrated circuit.

17. (Cancelled)

18. (Currently Amended) The computer program product of claim 16 further comprising:

code for controlling~~, by~~ the embedded micro-controller[[,]] to control one or more ~~integrated circuit~~ parameters selected from the group consisting of:

temperatures at one or more locations on the integrated circuit;

~~the integrated circuit power supply;~~

the operating clock frequency of the integrated circuit;

the power supply voltage supplied to the integrated circuit; and

the power supply current supplied to the integrated circuit.

19. (Currently Amended) The computer program product of claim 16 further comprising: code for controlling the ~~VLSI~~ environment to optimize an integrated circuit operating power level to approach a design limit.

20. (Currently Amended) The computer program product of claim 16, wherein the integrated circuit comprises a processor, the method further comprising:

code for monitoring a temperature in a core of the processor; and

code for reducing [[a]]the power supply voltage in response to an over-temperature condition in the core.

21. (Currently Amended) The computer program product of claim 16, wherein the integrated circuit comprises a processor, the method further comprising:

code for monitoring a temperature in a core of the processor; and

code for reducing ~~a processor~~ the operating clock frequency in response to an over-temperature condition in the core.

22. (Currently Amended) The computer program product of claim 16, wherein the integrated circuit comprises a processor, the method further comprising:

code for monitoring a temperature in a first core of the processor; and

code for transferring a processing workload from the first core to a second core of the processor in response to the temperature of said first core.

23. (Original) The computer program product of claim 16 further comprising:

code for monitoring current levels in the integrated circuits using ammeters comprising one or more voltage controlled oscillators.

24. (Currently Amended) A system for monitoring and controlling an integrated circuit comprising:

means for providing an embedded micro-controller on a same VLSI die as the integrated circuit; and

means for ~~monitoring and~~ controlling ~~a VLSI environment of the integrated circuit with~~ the embedded micro-controller[[;]]to:

~~wherein said embedded micro-controller monitors~~ monitor temperatures at a plurality of locations on the integrated circuit;

monitor one or more parameters selected from the group consisting of: power supplied to the integrated circuit, an operating clock frequency of the integrated circuit, a power supply voltage supplied to the integrated circuit, and a power supply current supplied to the integrated circuit; and

control an environment of the VLSI die based on the monitored temperatures and the one or more parameters to enhance operation of the integrated circuit.

25. (Currently Amended) The system of claim 24 further comprising:

means for controlling, using the embedded micro-controller, the ~~VLSI~~ environment to optimize an integrated circuit operating power level to approach a design limit.

26. (Currently Amended) The system of claim 24 further comprising:

means for reducing, using the embedded micro-controller, [[a]]the power supply voltage in response to an over-temperature condition at one of said plurality of locations.

27. (Currently Amended) The system of claim 24 further comprising:

means for reducing, using the embedded micro-controller, ~~a processor~~ the operating clock frequency in response to an over-temperature condition in the integrated circuit.

28. (Previously Presented) The system of claim 24 wherein the integrated circuit is a processor, the method further comprising:

means for monitoring, using the embedded micro-controller, a temperature in a first core of the processor; and

means for transferring, using the embedded micro-controller, a processing workload from the first core to a second core of the processor in response to the temperature of said first core.

29. (Currently Amended) The system of claim 1 wherein

said embedded micro-controller is further ~~adapted~~ configured to detect a difference in temperatures between said plurality of locations on the integrated circuit and redistribute workload in response to said temperature difference.

30. (Previously Presented) The method of claim 8 wherein

said embedded micro–controller detects a difference in temperatures between said plurality of locations on the integrated circuit and redistributes workload in response to said temperature difference.

31. (Previously Presented) The computer program product of claim 16 where

said embedded micro–controller detects a difference in temperatures between said plurality of locations on the integrated circuit and redistributes workload in response to said temperature difference.

32. (Previously Presented) The system of claim 24 where

said embedded micro–controller detects a difference in temperatures between said plurality of locations on the integrated circuit and redistributes workload in response to said temperature difference.